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## REVIEWS

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*Underground Water Resources of Iowa.* By W. H. NORTON and OTHERS. Iowa Geological Survey. Vol. XXI, Annual Reports for 1910 and 1911. Pp. 28-1186.

This report treats of the sources, conditions of occurrence, chemical ingredients, and amount of the underground waters of Iowa. The waters are considered under three heads: (1) artesian waters, which rise within the tube because of hydrostatic pressure; (2) waters of the country rock; and (3) waters of the drift. Important conclusions regarding these, especially the first, are based upon chemical analyses, deep drillings, and the structure and lithology of the rocks. The state is arbitrarily divided into eight districts, and more or less specific information is set forth for each.

The principal aquifers noted are the Saint Peter and the Prairie du Chien formations of the Ordovician system, and the Jordan, Dresbach, and underlying sandstones (unexposed) of the Cambrian. Superiority is generally ascribed to the Saint Peter, chiefly because it is efficient, accessible, and identifiable over about three-fourths of the state; it, however, is not tapped in the southwestern part, where it lies at great depth and its waters are likely to be mingled in the wells with the highly mineralized waters of the Carboniferous strata. In the western part of the northwest district the Dakota sandstone is a boon to good water conditions. The Paleozoics, especially the lower members which outcrop in Wisconsin, Minnesota, and Northwestern Iowa, dip gently to the southwest in the form of a wide, open trough which leaves the state at the southwest corner. The strata, however, have sufficient variations in structure and lithology to make forecasts somewhat uncertain. The water of artesian wells of the northeast quarter of the state is said to be the purest.

Reasonable consideration is also given to the water conditions of the country rock and drift, and a list of typical well-logs in the townships of each county is published. But the main stress is laid on municipal and industrial supplies, as evidenced by the frequent advices and cautions concerning the procuring of the same. Maps and structure sections clarify the geologic horizon of the important aquifers.

The book is of great value to the state for its clear exposition of the elemental factors entering into the artesian conditions of Iowa, for its appeal to the people to pursue intelligent methods in obtaining their water-supply, and for its emphasis on the increasing necessity of securing drinking-water free from organic matter. This creditable volume was planned during the régime of the late state geologist, Samuel Calvin, and completed under his successor, G. F. Kay. The work was carried on by the State Survey in co-operation with the United States Geological Survey.

M. M. LEIGHTON

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*The Coal Deposits of Missouri.* By HENRY HINDS. Missouri Geological Survey, Vol. XI, 2d Series, pp. 503; pls. 23; figs. 97; maps 7.

The present volume which is the result of co-operation between the Missouri Geological Survey and the U.S. Geological Survey, concerns itself with an economic discussion of the coals of Missouri. Quite properly, a mere outline of the stratigraphy is given and the deeper scientific problems are to be presented in a later report.

The arrangement of the volume is admirable. A short general discussion of the stratigraphy and structure is followed by a chapter on the mode of occurrence of the coals and a description of the different beds and fields. Statistics are presented showing production for various periods. The detailed report by counties arranged alphabetically, is a very desirable feature. Most of the letters of inquiry received by state surveys refer to counties, and it is thought that the grouping of detailed information into county units best meets the needs of the average reader.

Separate chapters are devoted to the quality and efficiency of the coals. In general, the fixed carbon and heat value decrease gradually across the state from south to north and west, the best coals occurring where the Ozark uplift had its greatest devolatilizing effect. Unfortunately, in the chapter on chemical analysis, it is not always clear whether figures given represent values "as received," "air-dried," or "moisture-free." In the tabulated analyses, emphasis is placed on "air-dried" values, whereas most engineers and consumers now compare coals either "as received" or on the "moisture-free" basis. On the latter basis, the coals of the entire state contain an average of 12,363 B.t.u. Tabulated results of tests on steaming, under boiler, for producer gas, on washed coal, and on coking and briquetting are presented in the final chapter.